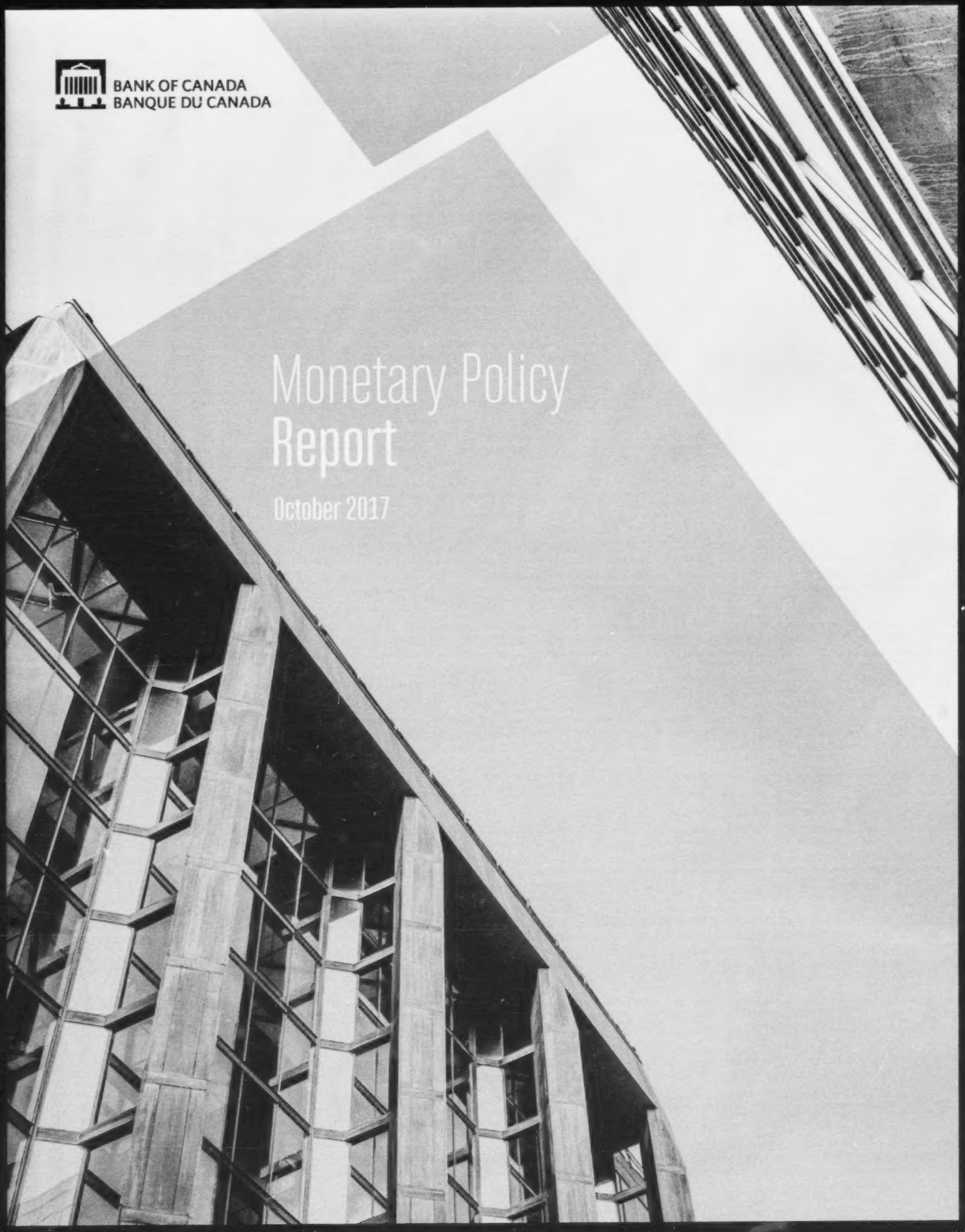
BANK OF CANADA
BANQUE DU CANADA

Monetary Policy Report

October 2017



Canada's Inflation-Control Strategy[1]

Inflation targeting and the economy

- The Bank's mandate is to conduct monetary policy to promote the economic and financial well-being of Canadians.
- Canada's experience with inflation targeting since 1991 has shown that the best way to foster confidence in the value of money and to contribute to sustained economic growth, employment gains and improved living standards is by keeping inflation low, stable and predictable.
- In 2016, the Government and the Bank of Canada renewed Canada's inflation-control target for a further five-year period, ending December 31, 2021. The target, as measured by the consumer price index (CPI), remains at the 2 per cent midpoint of the control range of 1 to 3 per cent.

The monetary policy instrument

- The Bank carries out monetary policy through changes in the target for the overnight rate of interest.[2] These changes are transmitted to the economy through their influence on market interest rates, domestic asset prices and the exchange rate, which affect total demand for Canadian goods and services. The balance between this demand and the economy's production capacity is, over time, the primary determinant of inflation pressures in the economy.
- Monetary policy actions take time—usually from six to eight quarters—to work their way through the economy and have their full effect on inflation. For this reason, monetary policy must be forward-looking.
- Consistent with its commitment to clear, transparent communications, the Bank regularly reports its perspective on the forces at work on the economy and their implications for inflation. The *Monetary Policy Report* is a key element of this approach. Policy decisions are typically announced on eight pre-set days during the year, and full updates of the Bank's outlook, including risks to the projection, are published four times per year in the *Monetary Policy Report*.

Inflation targeting is *symmetric* and *flexible*

- Canada's inflation-targeting approach is *symmetric*, which means that the Bank is equally concerned about inflation rising above or falling below the 2 per cent target.
- Canada's inflation-targeting framework is *flexible*. Typically, the Bank seeks to return inflation to target over a horizon of six to eight quarters. However, the most appropriate horizon for returning inflation to target will vary depending on the nature and persistence of the shocks buffeting the economy.

Monitoring inflation

- In the short run, the prices of certain CPI components can be particularly volatile. These components, as well as changes in indirect taxes such as GST, can cause sizable fluctuations in CPI.
- In setting monetary policy, the Bank seeks to look through such transitory movements in CPI inflation and focuses on a set of "core" inflation measures that better reflect the underlying trend of inflation. In this sense, these measures act as an operational guide to help the Bank achieve the CPI inflation target. They are not a replacement for CPI inflation.
- The Bank's three preferred measures of core inflation are CPI-trim, which excludes CPI components whose rates of change in a given month are the most extreme; CPI-median, which corresponds to the price change located at the 50th percentile (in terms of basket weight) of the distribution of price changes; and CPI-common, which uses a statistical procedure to track common price changes across categories in the CPI basket.

1 See *Joint Statement of the Government of Canada and the Bank of Canada on the Renewal of the Inflation-Control Target* (October 24, 2016) and *Renewal of the Inflation-Control Target: Background Information—October 2016*, which are both available on the Bank's website.

2 When interest rates are at very low levels, the Bank has at its disposal a suite of extraordinary policy measures that could be used to provide additional monetary stimulus and/or improve credit market conditions. The *Framework for Conducting Monetary Policy at Low Interest Rates*, available on the Bank's website, describes these measures and the principles guiding their use.

The *Monetary Policy Report* is available on the Bank of Canada's website at bankofcanada.ca.

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Monetary Policy Report

October 2017

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Global Economy

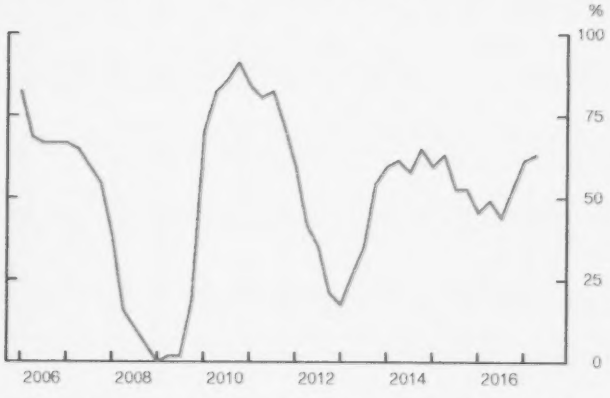
The global economic expansion continues to strengthen and broaden across countries (**Chart 1a**). Growth in the United States rebounded in the second quarter, and the expansion in the euro area appears to have firmed (**Chart 1b**). Economic activity is also showing signs of improvement in some oil-exporting countries and emerging-market economies (EMEs) that were previously in recession. Global growth is projected to average around 3 ½ per cent over the 2017–19 period, in line with the projections in the July *Monetary Policy Report* (**Table 1**).

Inflation has remained below target across most advanced economies, reflecting past excess capacity, still-weak wage growth and, in some cases, temporary factors. Inflation in wages and prices is expected to rise gradually as existing slack is absorbed.

The global outlook remains subject to substantial uncertainty, notably around US trade policy as well as geopolitical developments. The Bank's base-case projection continues to include some judgment that acknowledges the potential adverse effects of uncertainty on investment.

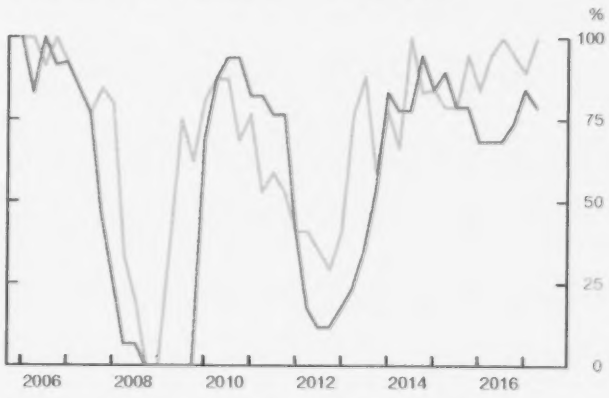
Chart 1: **Growth is becoming more synchronous across countries globally and within the euro area**

a. Real GDP growth in selected countries,[a] quarterly data



Share of countries with year-over-year growth exceeding the previous 3-year average

b. Real GDP growth in euro area countries, quarterly data



Share of countries with year-over-year growth exceeding the previous 3-year average
Share of countries with positive quarter-over-quarter growth

a. The share of countries is based on 57 advanced and emerging-market economies accounting for 87 per cent of global GDP in purchasing power parity.

Sources: National sources and Eurostat via Haver Analytics and Bank of Canada calculations

Last observation: 2017Q2

Table 1: **Projection for global economic growth**

	Share of real global GDP[a] (per cent)	Projected growth[b] (per cent)			
		2016	2017	2018	2019
United States	15	1.5 (1.6)	2.2 (2.2)	2.2 (2.1)	2.0 (1.8)
Euro area	12	1.8 (1.7)	2.3 (1.9)	1.8 (1.7)	1.6 (1.5)
Japan	4	1.0 (1.0)	1.5 (1.1)	0.9 (0.8)	0.8 (0.8)
China	18	6.7 (6.7)	6.8 (6.6)	6.4 (6.3)	6.3 (6.3)
Oil-importing EMEs[c]	33	3.6 (3.6)	4.0 (4.0)	4.0 (4.0)	4.2 (4.2)
Rest of the world[d]	18	1.0 (1.0)	1.4 (1.7)	2.2 (2.5)	2.8 (2.7)
World	100	3.0 (3.0)	3.4 (3.4)	3.4 (3.4)	3.5 (3.4)

a. GDP shares are based on International Monetary Fund (IMF) estimates of the purchasing-power-parity valuation of country GDPs for 2016 from the IMF's October 2017 *World Economic Outlook*.

b. Numbers in parentheses are projections used in the previous Report.

c. The oil-importing emerging-market economies (EMEs) grouping excludes China. It is composed of large emerging markets from Asia, Latin America, the Middle East and Africa (such as India, Brazil and South Africa) as well as newly industrialized economies (such as South Korea).

d. "Rest of the world" is a grouping of all other economies not included in the first five regions. It is composed of oil-exporting emerging markets (such as Russia, Nigeria and Saudi Arabia) and other advanced economies (such as Canada, the United Kingdom and Australia).

Source: Bank of Canada

Accommodative global financial conditions are supporting growth

Global financial conditions remain accommodative. Yields on long-term sovereign bonds have changed little on average since July; in particular, in the United States, Germany and Japan, yields have fluctuated within a narrow range. Stock market indexes in advanced economies have continued to climb amid improving economic sentiment and conditions. The US Federal Reserve's process of normalizing its balance sheet that began in October is expected to contribute to a modest and gradual steepening of the US yield curve. However, the announcement of these plans in September had a minimal impact on yields.

Partly reflecting increased uncertainty over US trade and fiscal policy, as well as softer inflation prospects, the US dollar had been weakening in 2017 against a basket of currencies, although it has regained some strength recently.

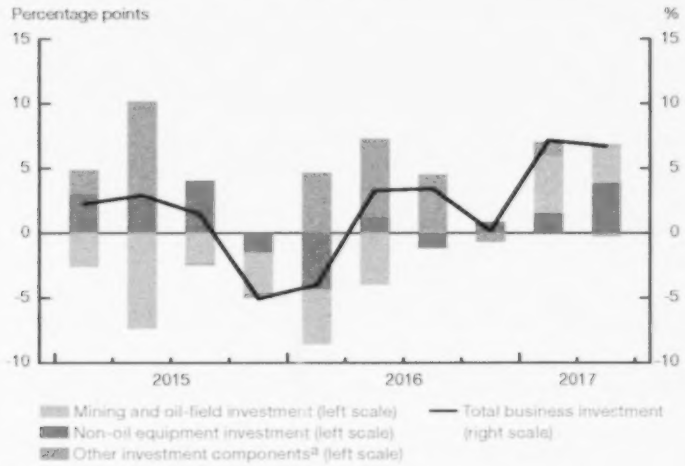
The US economy is projected to expand at a moderate pace

Economic growth in the United States rebounded in the second quarter, as anticipated in the July Report. Consumption growth improved after a weak first quarter. Business investment growth remained robust, supported by, but not limited to, the ongoing recovery in energy investment (Chart 2). In contrast, residential investment contracted following two quarters of strong growth, as spending on renovations and commissions on sales of existing homes declined.

The outlook for economic growth for the second half of 2017 is roughly unchanged from July. The recent hurricanes had a devastating impact on affected communities, with significant albeit transitory aggregate economic effects. Consumption, housing and business investment are likely to be negatively affected, resulting in a lower outlook for growth in gross domestic product (GDP) in the third quarter. Recovery and reconstruction efforts are expected to provide a modest boost to economic activity starting in the fourth quarter.

Chart 2: **US business investment growth remained robust**

Contributions to quarter-over-quarter annualized business investment growth, quarterly data



a. Other investment components include non-oil structures and intellectual property products.

Sources: US Bureau of Economic Analysis via Haver Analytics and Bank of Canada calculations

Last observation: 2017Q2

Overall, economic fundamentals remain consistent with projected GDP growth of about 2 per cent on average over 2017–19. Business investment is expected to expand at a solid pace. Consumption growth is anticipated to stay firm, supported by strong labour market conditions. Net exports, however, will likely continue to be a drag on growth.

As in July, the Bank's base-case projection does not incorporate any new fiscal or trade measures. While sizable tax cuts are under active consideration, material uncertainty remains about whether agreement will be reached on such a package and, if so, its size, timing and design. If stimulative fiscal measures were enacted, growth could be higher than projected. Likewise, growth could be lower if protectionist trade policies led to a generalized decline in cross-border co-operation.

The euro area economy has gained momentum

Second-quarter growth in the euro area was stronger than expected and remained broad-based across member countries. Data since the July Report also point to more momentum in economic activity than previously anticipated. As a result, the growth outlook for 2017 is now above 2 per cent. Growth should moderate gradually in 2018, reaching about 1 ½ per cent in 2019, roughly in line with the pace of expansion of potential output.

In Japan, economic activity in the second quarter strengthened significantly more than expected, resulting in an improved economic outlook for 2017. Growth was driven by a boost to public investment and a pickup in consumption. Overall, growth should slow to around 1 per cent over 2018–19, reflecting demographics and other structural factors, and a sluggish pace of nominal wage increases.

Inflation continues to track below target in advanced economies

Inflation has remained soft and generally below target in several advanced economies (**Chart 3**). Given the lag between economic activity and inflation, the ongoing strength in growth can be expected to contribute to improvements in labour market conditions and, therefore, a gradual firming in wage and price inflation.

The softness in core inflation in advanced economies has mainly been due to past excess capacity. However, in contrast to the United States, the decline in many countries that started in 2016 was likely associated with prior appreciation of their currencies and with falling prices of goods imported from emerging markets, notably China.[1] The effects of these factors appear to have largely dissipated, as suggested by the uptick in inflation in the euro area and Japan in recent months.

In the United States, core inflation started declining in 2017 despite the depreciation of the US dollar. A large part of this slowdown can be attributed to lower prices for services, such as telecommunications. Looking ahead, core inflation in the United States is expected to reach 2 per cent by 2019 as a tight labour market exerts upward pressure on wage inflation.

While the Bank assesses inflation dynamics through the lens of economic slack and inflation expectations, the continuing softness in inflation across a number of advanced economies calls for further analysis. One possible explanation is that the behaviour of inflation in advanced economies has changed, and inflation is now less responsive to changes in economic slack

Chart 3: **Inflation remains below target in advanced economies**

a. Aggregate deviation of year-over-year inflation measures from central bank total inflation targets,[a] monthly data

b. Deviation of year-over-year core inflation rates from central bank total inflation targets, monthly data

a. The aggregate deviation from total inflation targets is a weighted average for 11 advanced economies representing around 40 per cent of global GDP. The weighted average is calculated using GDP shares based on International Monetary Fund estimates of the purchasing-power-parity valuations of GDP. Inflation targets are fixed using 2017 targets.

Sources: National sources via Haver Analytics, International Monetary Fund and Bank of Canada calculations

Last observations: All series except euro area, August 2017; euro area, September 2017

1 For background information, see S. Bhatnagar, A.-K. Cormier, K. Hess, P. de Leon-Manlagnit, E. Martin, V. Rai, R. St-Cyr and S. Sarker, "Low Inflation in Advanced Economies: Facts and Drivers," Bank of Canada Staff Analytical Note No. 2017-16 (October 2017).

than in the past.[2] Another possibility is that technological advances, such as the rise of e-commerce and the digital economy, may be playing a role. So far, available evidence suggests that the overall effects of these technological factors on inflation are small, but the Bank will continue to examine the potential role of these and other factors (**Box 1**, page 8).

Emerging markets continue to drive global growth

Economic activity in China has been somewhat stronger than anticipated, with GDP expanding robustly in the third quarter. Nevertheless, growth is expected to soften in the coming quarters, mainly as a result of earlier policy measures targeting the housing and financial sectors and a smaller contribution from fiscal policy. Despite some progress on financial sector deleveraging, financial stability risks remain elevated as total credit continues to expand at a strong pace. Looking ahead, economic growth is expected to moderate from 6.8 per cent in 2017 to 6.3 per cent in 2019 as it continues to shift toward a more sustainable pace and composition.

For oil-importing EMEs, the economic environment has remained generally favourable, with narrow credit spreads and sustained capital inflows. GDP growth should average about 4 per cent over 2017–19, supported by ongoing recoveries in countries previously in recession and progress on growth-enhancing reforms. In India, economic growth has been dragged down by the lingering adverse effects of the currency exchange initiative launched in late 2016 as well as by the transitory costs associated with the introduction of the national goods and services tax in July. Notwithstanding the effects on near-term growth, these and other major reforms are expected to support medium-term growth in India.

Growth in the "rest of the world" grouping is expected to increase from about 1 ½ per cent in 2017 to around 2 ¾ per cent in 2019. The economic adjustment in oil-exporting countries is progressing as the impact from past declines in oil prices eases.

Prices of oil and industrial commodities have risen

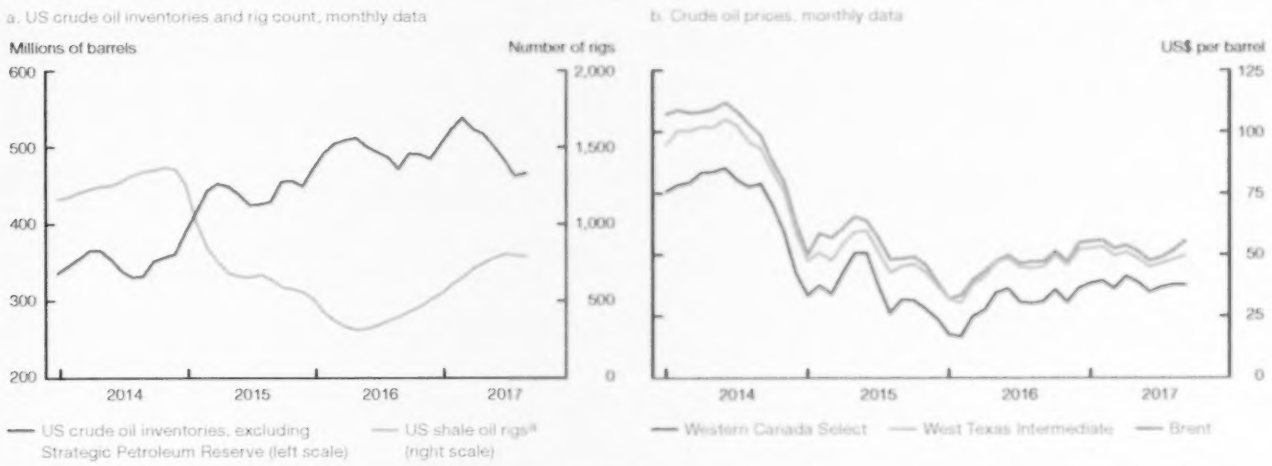
By convention, oil prices are assumed to remain close to their recent average of about US$55 per barrel (Brent), roughly US$5 higher than assumed in July (**Box 2**, page 9). Prices have been supported by stronger-than-expected demand over the summer, with US demand for gasoline reaching a five-year high. Declines in US crude oil inventories over the last six months and a recent stabilization in the number of active US oil rigs suggest that the oil market is rebalancing (**Chart 4**).

Over the near term, risks to the oil price assumption are tilted to the downside. Prices could be lower if excess supply results from a pickup in shale drilling activity in the United States or from a deterioration in compliance with agreed production cuts by the Organization of the Petroleum Exporting Countries and some other oil producers.

Prices of some non-energy commodities have also increased since July. Spot prices for base metals have risen by about 12 per cent in response to a combination of stronger global demand and commodity-specific supply factors. Strong steel production in China over the summer supported the rise

2. For example, the IMF's April 2013 *World Economic Outlook* finds evidence that the responsiveness of inflation to unemployment has been declining gradually since the mid-1970s. This flattening of the Phillips curve was found to hold throughout a sample of more than 20 advanced economies. These findings suggest that the inflation consequences of changes in economic slack are much smaller than in the past.

Chart 4: **Falling crude oil inventories and a stabilizing rig count in the United States have driven up oil prices since July**



a. As an indicator for shale oil rigs, we use the number of horizontal rigs in the United States, which can also include shale gas and some conventional rigs.

Sources: US Energy Information Administration, oil prices from exchange sources via Haver Analytics and Bloomberg L.P., Baker Hughes and Bank of Canada calculations

Last observation: September 2017

in prices of certain base metals, such as iron, nickel and zinc. In addition, higher aluminum prices have been supported by cuts to capacity in China, while concerns over further disruptions to mining activity in the Philippines have boosted nickel prices. Lumber prices have increased, driven mainly by wildfires in British Columbia and the western United States and potential supply disruptions caused by the hurricanes in the United States and the Caribbean. In contrast, agricultural prices have declined following a seasonal drop in livestock prices and expectations of stronger global crop yields.

Agricultural prices are expected to stay near current lows, while some modest growth in prices of base metals, excluding iron, should be supported by strong demand and ongoing declines in inventories. The Bank of Canada's non-energy commodity price index is therefore expected to remain roughly flat over the projection horizon, given these contrasting underlying outlooks.

Canadian Economy

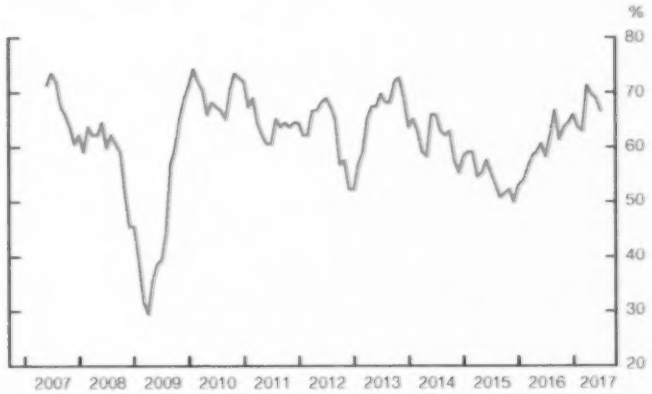
Economic activity continued to grow rapidly in the second quarter of 2017, exceeding expectations at the time of the July Report. Growth continued to be broadly based across regions and industries and has become more balanced across components of aggregate demand (Chart 5). In the first half of the year, growth was very strong. Consumption and residential investment were robust, and growth in exports and business investment picked up. In this context, excess capacity has declined more rapidly than expected, and the Bank now estimates the output gap to be between -0.5 and 0.5 per cent in the third quarter.

Looking ahead, the level of economic activity will be supported by rising foreign demand and the recent firming of commodity prices, still-accommodative monetary and financial conditions, and public infrastructure spending. The economy is expected to progress on a more sustainable path: the total contribution to growth from consumption and residential investment is projected to decline, in part because of recent interest rate increases, while the contribution from exports is expected to improve and that from business investment to remain steady.

The Bank's projection incorporates the effects of three important developments since July, namely, the policy rate increases in July and September, the appreciation of the Canadian dollar and the increase in commodity prices. It also reflects the Bank's current assessment of the following key issues: the level and future growth rates of potential output; the evolution of

Chart 5: **Growth continues to be broadly based across industries**

GDP at basic prices, percentage of 22 major industries growing on a month-over-month basis, 6-month moving average, monthly data



Sources: Statistics Canada and Bank of Canada calculations

Last observation: July 2017

Box 1

Canadian Inflation: The Role of Globalization and Digitalization

The role of globalization and digitalization has received increasing attention among policy-makers as a potential explanation for soft inflation across a number of advanced economies. In this context, the Bank has investigated whether such global factors might shed light on unexplained softness in Canadian inflation in recent years.[1,2]

Globalization is likely not a significant contributor to inflation softness

Given that Canada is a small open economy, there is considerable scope for globalization to affect Canadian inflation. For example, increased imports of goods from China in the 2000s were estimated to have reduced inflation in Canada.[3]

Globalization may influence inflation through several channels. New analysis examining the recent unexplained softness in inflation considered the impact coming through import prices, including the implications of global slack. It also explored the effect of the integration of Canada in global value chains on domestic wages and price setting. This analysis did not detect a significant link between these factors and the unexplained softness, although over time the factors could become more relevant.

The effect of digitalization on Canadian inflation appears to be small, but this could change

As noted in the July Report and in Poloz (2017), structural changes related to technological advances and digitalization could also be affecting consumer price index (CPI) inflation globally.[4] Bank staff have reviewed the literature on the implications of digitalization for inflation and reported on consultations with firms on the digital transformation in some service industries.[5]

This analysis reviews three key channels through which digital technologies may affect inflation:

- **Falling prices of goods and services related to information and communications technology (ICT) can affect the CPI.** The prices of some ICT products have rapidly decreased since the 1990s as a result of technological improvements. However, the trend in Canada appears to be somewhat different, reflecting in part limited competition in the Canadian telecommunications sector, which has offset some of the downward pressure on prices relative to other countries.[6]
- **Digital technologies can change market structure.** Digital technologies can allow certain "superstar" firms to become dominant, but they can also increase competition, especially through e-commerce, which may influence how retailers set prices. Evidence for Canada suggests the latter impact is likely limited so far because of the very small share of online retail sales held by Canadian firms and the similarity between the behaviour of online and offline prices.[7] To the extent that technologies are substitutes for labour, they may reduce the bargaining power of workers and weigh on wage growth.
- **Cost-efficient technologies lead to increases in productivity.** Digital innovation can create disinflationary pressure through a reduction in production costs. However, productivity effects from digitalization are difficult to identify in official statistics.[8] Results from the Bank's consultations suggest that, on balance, firms have seen some reduction in operational costs, but efficiencies are yet to be realized for many.

There is some evidence that digitalization has had a dampening effect on inflation in advanced economies.[9] However, its effect on Canadian inflation appears to be small. The relatively low adoption rate of e-commerce and other digital technologies in Canada compared with other advanced economies could be one explanation for smaller effects in Canada.

The Bank will continue to explore the evolving role of global factors, particularly digitalization.

1 See D. Brouillette and L. Savoie-Chabot, "Global Factors and Inflation in Canada," Bank of Canada Staff Analytical Note No. 2017-17 (October 2017).

2 The Bank bases its analysis on a Phillips curve framework, where inflation dynamics are explained by a measure of economic slack, inflation expectations, movements in commodity prices and movements in the exchange rate.

3 See L. Morel, "The Direct Effect of China on Canadian Consumer Prices: An Empirical Assessment," Bank of Canada Staff Discussion Paper No. 2007-10 (September 2007).

4 S. S. Poloz, "The Meaning of 'Data Dependence': An Economic Progress Report" (speech to the St. John's Board of Trade, St. John's, Newfoundland and Labrador, September 27, 2017).

5 See W. Dong, J. Fudurich and L. Suchanek, "Digital Transformation in the Service Sector—Insights from Consultations with Firms in Wholesale, Retail and Logistics," Bank of Canada Staff Analytical Note (forthcoming); and K. Charbonneau, A. Evans, S. Sarker and L. Suchanek, "Digitalization and Inflation: A Review of the Literature," Bank of Canada Staff Analytical Note (forthcoming).

6 See, for example, Sveriges Riksbank, "Digitalization and Inflation," *Monetary Policy Report* (February 2015): 55–59.

7 See, for example, A. Cavallo, "Are Online and Offline Prices Similar? Evidence from Large Multi-Channel Retailers," *American Economic Review* 107, no. 1 (2017): 283–303; and Y. Gorodnichenko and O. Talavera, "Price Setting in Online Markets: Basic Facts, International Comparisons, and Cross-Border Integration," *American Economic Review* 107, no. 1 (2017): 249–282.

8 E. Brynjolfsson and A. McAfee, "Race Against the Machine: How the Digital Revolution Is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy," The MIT Center for Digital Business Research Brief (January 2012).

9 See, for example, Sveriges Riksbank (2015); M. Ciccarelli and C. Osbat, "Low Inflation in the Euro Area: Causes and Consequences," European Central Bank Occasional Paper Series No. 181 (January 2017); and ECB, *Economic Bulletin*, Issue 2 (2015).

Box 2

Key Inputs to the Base-Case Projection

The Bank's projection is always conditional on several key assumptions, and changes to them will affect the outlook for the global and Canadian economies. The Bank regularly reviews these assumptions and assesses the sensitivity of the economic projection to them.

- Oil prices are assumed to remain near recent average levels. The per-barrel prices in US dollars for Brent, West Texas Intermediate and Western Canada Select are about $55, $50 and $40, respectively, about $5 higher than assumed in the July Report.
- By convention, the Bank does not attempt to forecast the exchange rate in the base-case projection. Over the projection horizon, the Canadian dollar is assumed to remain close to its recent average of 81 cents, compared with the 76 cents assumed in July.
- The Bank estimates that the output gap is in a range of -0.5 to 0.5 per cent in the third quarter. For the projection, the output gap is assumed to be at the midpoint of this range.[1] This compares with the July assumption that the output gap was -0.5 per cent, the midpoint of a -1 to 0 range, in the second quarter of 2017.
- Business investment in the second quarter of 2017 was more robust than expected, and this increased strength is expected to persist over the projection horizon. Thus, the annual growth of potential output is now assumed to be 1.5 per cent over 2018–19, which is slightly above the assumption since April 2017 (**Table 2**). Further details on the Bank's assessment of potential output are provided in the Appendix to the April 2017 Report, and a full reassessment will be presented in April 2018.
- The neutral nominal policy rate is defined as the real rate that is consistent with output at its potential level and with inflation equal to target after the effects of all cyclical shocks have dissipated, plus 2 per cent for the inflation target. For Canada, the neutral rate is estimated to be between 2.5 and 3.5 per cent. The economic projection is based on the midpoint of this range, which remains unchanged.

1 The level of potential output is estimated to be about 0.1 per cent higher in the second quarter than projected in the July Report, while the level of GDP is higher by 0.3 per cent.

wages and inflation, together with the potential implications of globalization and technology (**Box 1**); and the sensitivity of the economy to interest rates given elevated household indebtedness.[3] Over time, the Bank will update its judgment as appropriate with additional data.

Largely as a result of the robust pace of growth in the first half of the year, real GDP is forecast to grow at 3.1 per cent in 2017. Relative to the July projection, growth for the year is revised up, mainly because of unexpected strength in household consumption and business investment in the second quarter. After moderating in the second half of 2017, GDP is expected to grow by 2.1 per cent in 2018 and 1.5 per cent in 2019 (**Table 2** and **Box 2**). As such, economic activity is forecast to remain close to full capacity and at times possibly modestly above, depending on how the supply side of the economy evolves.

Consumer price index (CPI) inflation has recently picked up from low levels, reflecting higher gasoline prices, dissipating drag from food inflation, and improving economic conditions. Inflation is expected to continue to rise toward 2 per cent as the temporary effects of past fluctuations in food and electricity prices fade. Compared with the July inflation projection, the stronger Canadian dollar is expected to have a dampening impact in 2018, while the more rapid absorption of economic slack is expected to have an opposite, albeit smaller, effect. In this context, inflation is projected to increase to close to 2 per cent over the course of 2018 and to remain around 2 per cent until the end of 2019.

3 S. S. Poloz, "The Meaning of 'Data Dependence': An Economic Progress Report" (speech to the St. John's Board of Trade, St. John's, Newfoundland and Labrador, September 27, 2017).

Table 2: **Contributions to average annual real GDP growth**
Percentage points[a, b]

	2016	2017	2018	2019
Consumption	1.4 (1.4)	2.1 (1.9)	1.3 (1.3)	1.0 (1.0)
Housing	0.2 (0.2)	0.2 (0.3)	0.0 (0.0)	-0.2 (-0.1)
Government	0.5 (0.5)	0.4 (0.5)	0.4 (0.3)	0.2 (0.0)
Business fixed investment	-1.0 (-1.0)	0.2 (-0.1)	0.4 (0.3)	0.3 (0.4)
Subtotal: Final domestic demand	1.1 (1.1)	2.9 (2.6)	2.1 (1.9)	1.3 (1.3)
Exports	0.4 (0.4)	0.5 (0.5)	0.6 (0.7)	0.8 (0.8)
Imports	0.2 (0.2)	-1.0 (-0.9)	-0.5 (-0.6)	-0.6 (-0.5)
Subtotal: Net exports	0.6 (0.6)	-0.5 (-0.4)	0.1 (0.1)	0.2 (0.3)
Inventories	-0.3 (-0.3)	0.7 (0.6)	-0.1 (0.0)	0.0 (0.0)
GDP	1.5 (1.5)	3.1 (2.8)	2.1 (2.0)	1.5 (1.6)
Memo items (percentage change):				
Range for potential output	1.1–1.5 (1.1–1.5)	1.0–1.6 (1.0–1.6)	1.1–1.7 (1.1–1.7)	1.1–1.9 (1.1–1.9)
Real gross domestic income (GDI)	0.8 (0.8)	4.0 (4.0)	2.3 (1.5)	1.6 (1.5)
CPI inflation	1.4 (1.4)	1.5 (1.6)	1.7 (1.8)	2.1 (2.1)

a. Numbers in parentheses are from the projection in the previous Report.
b. Numbers may not add to total because of rounding.

Growth is still expected to moderate in the second half of 2017

The economy grew at a rapid pace in the first half of 2017, averaging just over 4 per cent growth at an annual rate (Table 3, Chart 6). This exceptional strength reflected robust growth in consumer spending, underpinned by favourable financial conditions and rising household employment and income. Consumption growth has become more widespread across regions, since the rebound in incomes in energy-producing provinces is now more entrenched. A broad-based expansion in business investment and a surge in energy exports were also contributors to growth. However, after a strong first quarter, housing activity pulled back in the second quarter. The housing decline was driven by a contraction of resale activity in the Toronto market, which was partly in response to the measures introduced by the Ontario government in April (Chart 7). Overall, real GDP growth in the first half of the year was widespread, with more than two-thirds of industries and most major demand components contributing to the expansion.

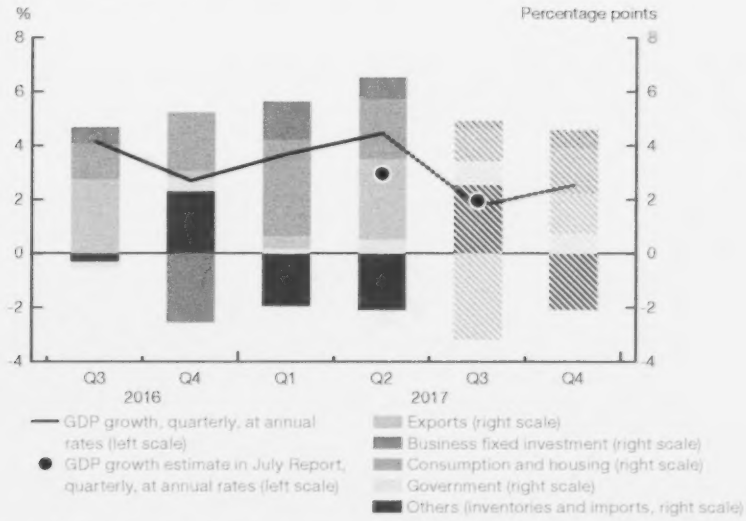
Table 3: **Summary of the projection for Canada**
Year-over-year percentage change[a]

	2017				2016	2017	2018	2019
	Q1	Q2	Q3	Q4	Q4	Q4	Q4	Q4
CPI inflation	1.9 (1.9)	1.3 (1.4)	1.4 (1.3)	1.4	1.4 (1.4)	1.4 (1.6)	2.1 (2.0)	2.1 (2.1)
Real GDP	2.3 (2.3)	3.7 (3.4)	3.1 (2.8)	3.1	2.0 (2.0)	3.1 (2.7)	1.7 (1.8)	1.5 (1.5)
Quarter-over-quarter percentage change at annual rates[b]	3.7 (3.7)	4.5 (3.0)	1.8 (2.0)	2.5				

a. Numbers in parentheses are from the projection in the previous Report. Details on the key inputs into the base-case projection are provided in Box 2.
b. Over the projection horizon, 2017Q3 and 2017Q4 are the only quarters for which some information about real GDP growth was available at the time the projection was conducted. This is why quarter-over-quarter percentage changes are not presented past that horizon. For longer horizons, fourth-quarter-over-fourth-quarter percentage changes are presented.

Chart 6: **The recent strong growth is expected to moderate**

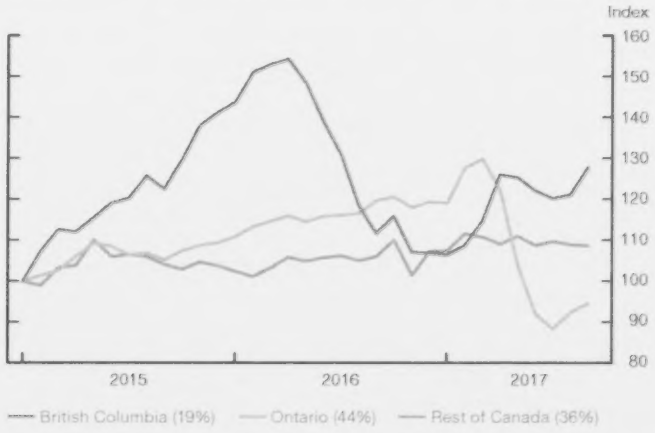
Contribution to real GDP growth, quarterly data



Sources: Statistics Canada and Bank of Canada estimates and calculations Last data plotted: 2017Q4

Chart 7: **Dynamics of housing activity vary across regions**

Multiple Listing Service residential sales, index: January 2015 = 100, monthly data



Note: Numbers in parentheses represent the latest 12-month moving average of the share of total MLS residential sales. Shares do not add to 100% because of rounding.

Sources: Canadian Real Estate Association and Bank of Canada calculations Last observation: September 2017

Real GDP growth is expected to moderate to a still-solid pace close to 2 per cent at an annual rate over the second half of the year as growth in consumption and investment slows and exports temporarily decline in the third quarter. Still, consumption growth is expected to remain solid, supported by ongoing growth in employment and income and elevated consumer confidence. The Canada child benefit introduced in 2016 will continue to support the level of consumption, although the effects on growth have dissipated. Recent data show a decline in drilling rig activity and weakness

in imports of machinery and equipment. Nonetheless, business investment growth is expected to pick up later in the year, buoyed in part by the launch of some large projects.[4]

The temporary decline in exports in the third quarter is largely due to scheduled reductions in motor vehicle production and the unwinding of temporary factors that boosted growth in the spring.[5] However, with the reversal of these temporary effects, export growth is anticipated to rebound in the fourth quarter, in line with foreign demand. Housing activity is estimated to have declined further in the third quarter, dampened by the slowdown in Ontario, but is expected to increase in the fourth quarter, as resales have recently started to pick up.

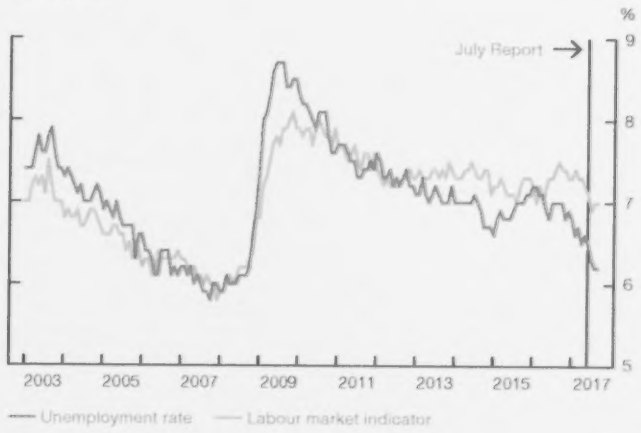
The economy is operating close to capacity

Robust growth over recent quarters has contributed to a rapid narrowing of the output gap, and the Bank estimates that the Canadian economy is now operating close to capacity (Box 2).[6] This estimate incorporates an assessment of the impact of strong recent investment on potential output growth. The robust growth of demand, combined with declining excess capacity, is providing an important incentive for businesses to invest and hire more workers. New firms could also be created, and workers could increase their hours worked or participation in the labour force.[7]

Growth in employment has remained strong at the national level and has been broad-based across sectors and regions. The unemployment rate has continued to fall, but its decline likely overstates the degree of improvement in the labour market (Chart 8). In particular, the Bank's labour market indicator, a composite indicator, is still relatively high. Its current level reflects

Chart 8: **The Bank's labour market indicator is still relatively high**

Monthly data



Sources: Statistics Canada and Bank of Canada calculations Last observation: September 2017

4 Several large multi-year projects began around mid-2017, including Husky's West White Rose project in Newfoundland and Labrador, and Enbridge's Line 3 in Alberta and Saskatchewan and gas pipeline expansion in British Columbia.

5 Changes in the production mandates of multinational automobile assemblers are coming into effect in the second half of 2017.

6 Responses to the Bank's autumn *Business Outlook Survey* also suggest that, although the degree of slack differs across regions, capacity pressures have increased over the past 12 months.

7 The endogenous response of labour market participation and hours worked to strong demand growth contributes 0.3 per cent to the level of potential by the end of 2019. This response was originally incorporated into the Bank's projection in the April 2016 Report.

Box 3

Wage Dynamics and Inflationary Pressures

Inflationary pressures coming from wages are muted

The Canadian economy has benefited from impressive employment gains over the past year. Nonetheless, there is evidence of slack remaining in the labour market; for example, average hours worked, although improving, are still below trend.[1] Other evidence of labour market slack comes from the Bank of Canada labour market indicator, which remains high relative to its level before the Great Recession, and from the labour force participation rate of youth, which remains low.

The growth of compensation per hour worked and various measures of wage growth also remain below their historical averages. For example, unit labour costs for both the total economy and the resource sector have been declining since 2016 (Chart 3-A). Unit labour cost (ULC)—defined as labour compensation per hour worked divided by labour productivity—is viewed as a useful way to measure inflationary pressure coming from the labour market. ULC has declined recently because labour productivity has grown faster than hourly compensation (Chart 3-B). Overall, labour cost pressures are growing at a moderate pace and are below what would be expected at this stage of the cycle. Consequently, inflationary pressures from wages remain muted.

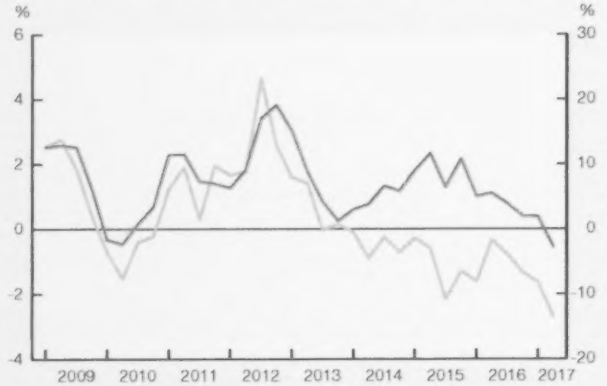
Another factor that could explain the absence of wage pressures is globalization.[2] The possibility of relocating production activities to low-wage countries may have reduced the bargaining power of workers in advanced economies and lowered their wage expectations. In turn, more-integrated global activity and openness to trade could also increase competition in domestic markets, which could further restrain the growth of domestic wages.

Labour market slack is weighing on wage growth

Based on estimates from a wage-equation regression model, past labour market slack appears to be the key factor weighing on wage growth since 2011, with the peak impact of labour market slack on wage inflation being felt after

Chart 3-A: **Growth in unit labour costs has been subdued recently**

Year-over-year percentage change, quarterly data

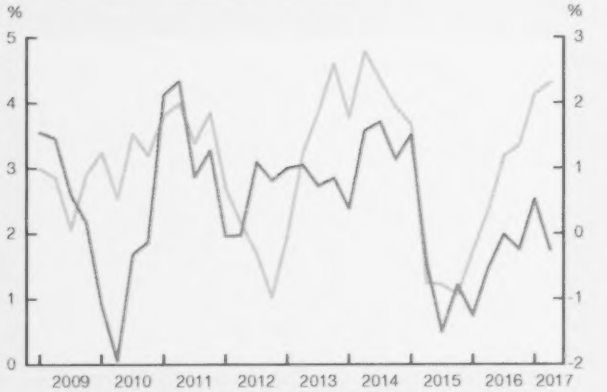


Sources: Statistics Canada and Bank of Canada calculations

Last observation: 2017Q2

Chart 3-B: **Unit labour costs decrease when compensation grows less quickly than labour productivity**

Year-over-year percentage change, quarterly data



Sources: Statistics Canada and Bank of Canada calculations

Last observation: 2017Q2

1 See D. Brouillette, K. Gribbin, J.-D. Guénette, J. Kelcheson, O. Kostyshyna, J. Lachaine and C. Scarfe, "A Canada–US Comparison of Labour Market Conditions," Bank of Canada Staff Analytical Note No. 2017-4 (April 2017).

2 The impact of globalization on inflation is discussed in **Box 1**.

(continued...)

Box 3 (*continued*)

roughly one year.[3] The drag from weak labour productivity in 2015 has now dissipated, owing to the rebound of labour productivity over the first half of 2017. But other factors could also be at play. For example, workers formerly employed in the relatively high-paying oil and gas sector may have moved to lower-paid jobs in other sectors. Bank staff estimate that the decline in commodity prices may have reduced wage growth by about 0.5 percentage points by mid-2016. However, these reallocation effects, and other factors holding down wage growth, appear to be fading.

Wage growth is expected to pick up as labour market slack dissipates

Wage growth is projected to increase as the effects of past labour market slack continue to dissipate in coming quarters. Moreover, if productivity growth remains strong, it could lead to higher wages, especially as the labour market tightens. Wage growth could potentially accelerate if labour shortages were to become more pervasive since, historically, strong wage growth has been associated with significant excess demand in the labour market.

The recently announced increases to the minimum wage in Ontario and Alberta could have disproportionately higher effects on the wages of younger workers. However, they are expected to have only a small positive impact on aggregate national wages.

Looking ahead, stronger wage growth should contribute to the expected gradual increase in inflation over the projection horizon.

3 See D. Brouillette, J. Ketcheson, O. Kostyshyna and J. Lachaine, "Wage Growth in Canada and the United States: Factors Behind Recent Weakness," Bank of Canada Staff Analytical Note No. 2017-8 (July 2017). Labour market slack is measured by the labour gap—the percentage difference between actual total hours worked and trend total hours worked, based on the integrated framework approach to estimating potential output and the output gap. See L. Pichette, P. St-Amant, B. Tomlin and K. Anoma, "Measuring Potential Output at the Bank of Canada: The Extended Multivariate Filter and the Integrated Framework," Bank of Canada Staff Discussion Paper No. 2015-1 (January 2015).

the fact that the long-term unemployment rate remains elevated, average hours worked remain low and wage growth continues to be modest (for details on wage growth dynamics, see Box 3). With recent productivity gains exceeding wage increases, labour cost pressures have been relatively low. Moreover, according to the autumn *Business Outlook Survey*, there is clear evidence of ongoing slack in energy-producing regions. As well, binding labour shortages appear to be prevalent only in British Columbia and in specific sectors.

Taken together, these developments indicate that labour markets are not yet a source of inflationary pressures and that opportunities for further expansions of employment remain.

Inflation has increased as expected and remains below 2 per cent

CPI inflation has increased in recent months, largely as expected. CPI inflation rose from a trough of 1 per cent in June to 1.6 per cent in September, mostly reflecting dynamics in gasoline prices. Hurricane Harvey's disruption of refining capacity temporarily boosted gasoline prices and, thus, inflation by 0.2 percentage points in September. Additional contributors to the recent rise in CPI inflation were the fading effects of factors such as weak inflation in food prices and dissipating economic slack. However, these two factors, together with the electricity rebates in Ontario, still contribute to keeping CPI inflation below the 2 per cent target. Moreover, the recent appreciation of the Canadian dollar is estimated to reduce projected inflation. Several other factors, including digitalization, may be having some dampening impact on inflation (Box 1).

Inflation in the second half of 2017 is expected to be similar on average to that forecast in July. The impact of the change in the exchange rate is slightly greater, while that from economic slack is slightly less.

Chart 9: **The Bank's three measures of core inflation drifted up, consistent with decreasing economic slack**

Year-over-year percentage change, monthly data

Sources: Statistics Canada and Bank of Canada

Last observation: September 2017

Core inflation measures also started to drift upward in recent months, consistent with declining slack in the past and the diminishing drag from weak food inflation. The range of core measures was 1.5 to 1.8 per cent in September (Chart 9). These levels are roughly consistent with estimates of the evolution of excess capacity over previous quarters.

Monetary and financial conditions are somewhat less stimulative

Financial conditions for both households and businesses remain broadly stimulative but have become less so since the middle of this year (Chart 10). Market interest rates have risen, partly reflecting improvements in economic conditions in Canada and related increases in the Bank's policy rate in July and September.

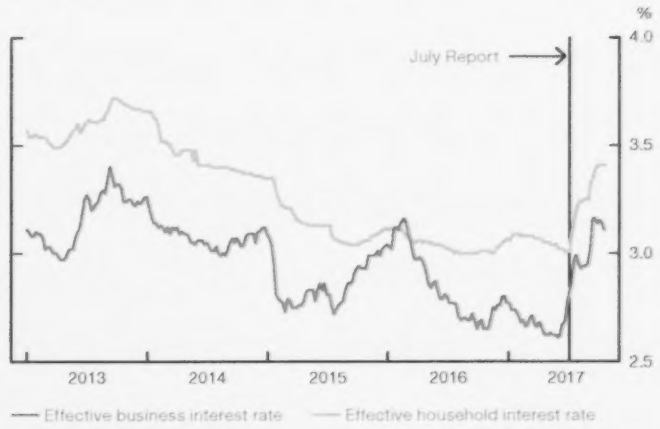
The rise in bank funding costs prompted financial institutions to raise mortgage and consumer credit rates. For example, five-year fixed mortgage rates have increased by about 50 basis points since the July Report. The estimated effective rate for businesses has increased by about 50 basis points since early June, in line with business prime rates. In that context, the Bank's *Business Outlook Survey* and *Senior Loan Officer Survey* both report that, aside from the overall increase in interest rates, business lending conditions were broadly unchanged during the third quarter of 2017.[8] The surveys noted that recent healthy firm performance and competition among lenders helped ease non-price borrowing conditions for businesses, while some firms in commodity and related industries saw a modest rise in borrowing costs.

The Canadian dollar has appreciated against the US dollar, reflecting higher commodity prices, narrower US–Canada interest rate spreads and the weaker US dollar. The US dollar remains somewhat lower than it was in July, despite firming in recent weeks.

8 Both surveys define the cost of credit as spreads over base rates rather than as the level of rates.

Chart 10: **Borrowing rates have increased recently**

Weekly data



Note: For more information on the series, see Statistics > Credit Conditions > Financial Indicators on the Bank of Canada's website.

Source: Bank of Canada

Last observation: October 20, 2017

GDP growth is expected to moderate to a more sustainable pace

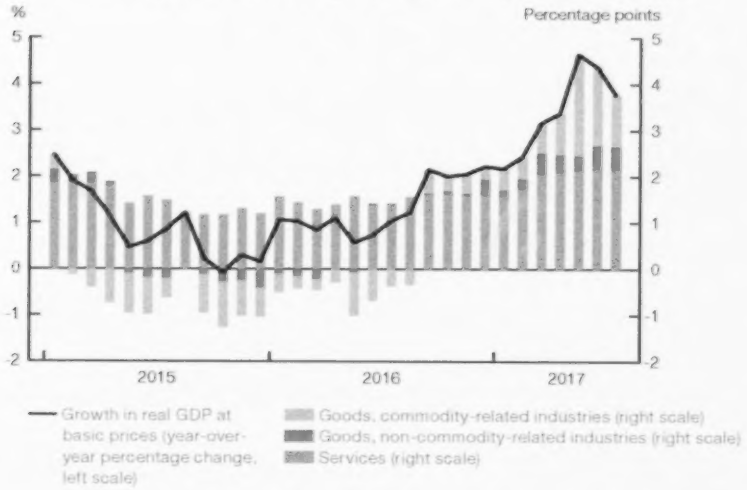
The Bank projects that economic growth will slow and quarterly growth rates will average close to potential growth over 2018–19 (Table 3). The composition of GDP growth is anticipated to remain relatively balanced. Solid growth of foreign demand is expected to support export growth and promote business investment. Consumption and residential investment are projected to moderate as households respond to less-accommodative financial conditions and as macroprudential and other housing policy measures continue to weigh on activity in the housing market. Government spending is expected to boost growth over the coming quarters, reflecting previously announced fiscal measures.[9]

Economic growth is expected to remain broad-based across sectors. The solid expansion of the service sector is projected to continue, and the recent strength in goods-producing industries is now more entrenched (Chart 11). Results from the *Business Outlook Survey* also suggest that strong indicators of future sales remain widespread across regions and sectors (Chart 12).

9 The Bank's scenario also incorporates measures announced since the July 2017 Report, including the new spending measures contained in the British Columbia budget update. Moreover, the persistently weaker-than-expected data for government infrastructure spending suggest a more modest pickup in the current year and, therefore, a smaller payback thereafter than was projected in July.

Chart 11: **The expansion of the service sector continues, while the strength in goods-producing industries is more entrenched**

Contribution to growth in real GDP at basic prices, seasonally adjusted, monthly data

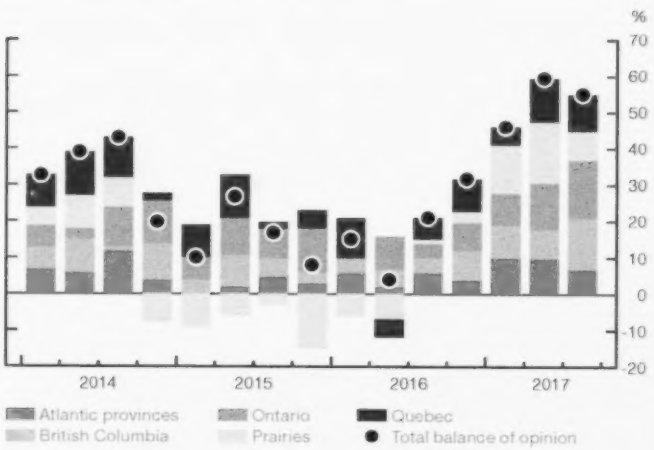


Sources: Statistics Canada and Bank of Canada calculations

Last observation: July 2017

Chart 12: **Indicators of future sales continue to suggest healthy sales prospects across all regions**

Contribution to balance of opinion,[a] quarterly data



a. Percentage of firms in the *Business Outlook Survey* reporting that recent indicators (order books, advance bookings, sales inquiries, etc.) have improved compared with 12 months ago minus the percentage of firms reporting that indicators have deteriorated

Source: Bank of Canada

Last observation: 2017Q3

The recovery in business investment is becoming more entrenched

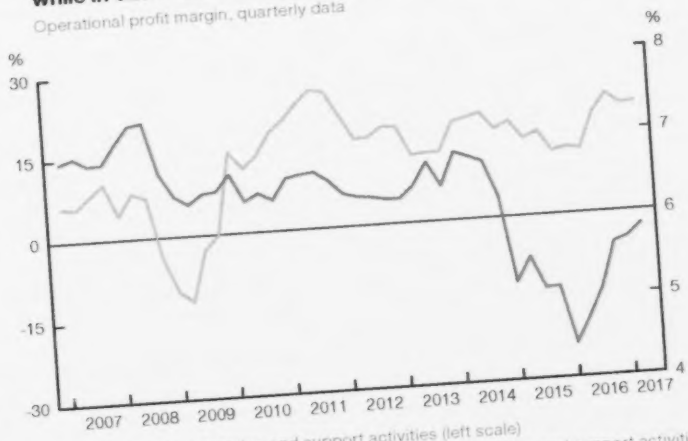
After rebounding in the first part of 2017, business investment is expected to grow at a more moderate, but steady, pace over the projection period. With the economy operating close to capacity, ongoing increases in household and foreign demand, solid profit margins and robust business confidence are expected to support growth in business investment (**Chart 13** and **Chart 14**). Results from the autumn *Business Outlook Survey* indicate that while intentions to increase investment spending have come down from recent high levels, they remain widespread across sectors and regions.[10]

Data on business investment may not fully capture firm expenditures to increase capacity and productivity. For example, spending on cloud computing or other information technology infrastructure services is often treated as an operating expense rather than as an investment per se. Yet, such innovation may lead to stronger productivity and potential output for a given level of investment spending. The results of both the *Business Outlook Survey* and consultations conducted by the Bank indicate that businesses expect to continue to focus on digital technologies to grow their productive capacity.[11]

The firming of global commodity prices and the improvement in the balance sheets of oil and gas companies will support a gradual expansion of commodity-related investment, but growth prospects are limited, given the assumed outlook for oil prices (**Box 2**). Non-commodity business investment is expected to expand with the growth of demand in Canada's major trading partners. Nevertheless, uncertainty about US trade policy and structural

Chart 13: **Profit margins for oil and gas industries are recovering strongly, while in other industries they remain close to historical highs**

Operational profit margin, quarterly data



Sources: Statistics Canada and Bank of Canada calculations

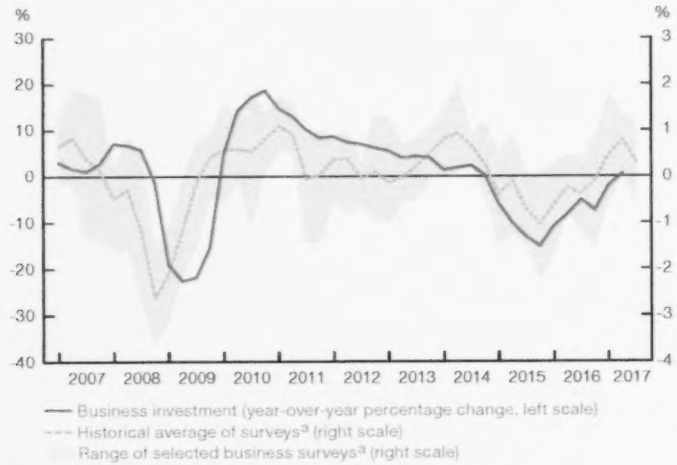
Last observation: 2017Q2

10 The survey was conducted from August 24 to September 19, before the US Department of Commerce issued a preliminary ruling recommending the levy of countervailing and anti-dumping duties on some Canadian aircraft exports.

11 See, for example, OECD, "Key Issues for Digital Transformation in the G20" (January 12, 2017); B. van Ark, C. Corrado, A. Erumban and G. Levanon, "Navigating the New Digital Economy," Conference Board of Canada (2016); and W. Dong, J. Fudurich and L. Suchanek, "Digital Transformation in the Service Sector—Insights from Consultations with Firms in Wholesale, Retail and Logistics," Bank of Canada Staff Analytical Note (forthcoming).

Chart 14: **Indicators of business sentiment have improved in recent quarters**

Quarterly data



a. Deviations from their historical average and scaled by their standard deviations

Sources: Statistics Canada, The Conference Board of Canada, The Gandalf Group, Canadian Federation of Independent Business, IHS Markit, Chartered Professional Accountants of Canada, Export Development Canada, Bank of Canada and Bank of Canada calculations

Last observations: Business investment, 2017Q2; range and historical average of selected surveys, 2017Q3

challenges, including expected low trend labour force and productivity growth in Canada relative to history, are expected to continue to restrain investment growth.[12]

Exports are anticipated to grow in line with foreign demand

As expected in July, Canadian export growth has shown temporary weakness in recent months, partly due to the expected retrenchment in automobile production in the third quarter. Over the projection, exports are anticipated to grow roughly in line with strengthening foreign demand (**Chart 15**). The growth of imports is expected to slow with decelerating domestic demand. However, the contribution of net exports to GDP growth over 2018 and 2019 is slightly weaker than anticipated in the July Report following the recent appreciation of the Canadian dollar.

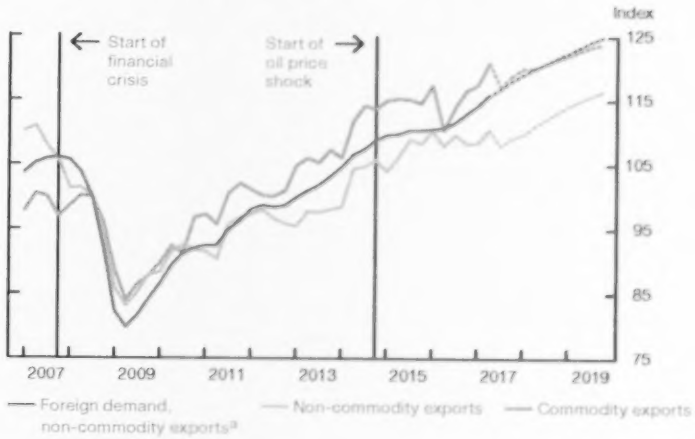
Over the past year, the growth of exports of services, driven by transportation and travel services, has been solid and should continue at a similar pace. Non-commodity goods exports have also picked up recently, and several goods components, including industrial machinery and equipment, plastics and rubber products, and food and beverage products, are expected to benefit from global growth.

As a result of several ongoing challenges, the growth of non-commodity goods exports is expected to remain moderate. Deteriorating competitiveness and the relocation of production outside Canada by some multinational firms have contributed to a loss of productive capacity and a reduction in the global market share of Canadian goods exporters. An important

12. The effect of this uncertainty is projected to reduce investment growth by about 0.7 percentage points and subtract about 0.2 percentage points from Canadian export growth in both 2017 and 2018.

Chart 15: **Exports are projected to increase with foreign demand**

Chained 2007 dollars, index: 2008Q3 = 100, quarterly data



a. Foreign demand for Canadian non-commodity exports is based on GRACE (2007 = 100). For details, see A. Binette, T. Chernis and D. de Munnik, "Global Real Activity for Canadian Exports: GRACE," Bank of Canada Staff Discussion Paper No. 2017-2 (January 2017).

Sources: Statistics Canada and Bank of Canada calculations and projections

example is recent developments in the auto industry. Uncertainty about proposed trade measures and the status of trade agreements is also assumed to be hindering Canada's ability to benefit from an improving global outlook.

Growth of commodity exports is expected to be modest over the next two years, since production and exports have been restrained by limited investment in new capacity in the sector in recent years. Over the longer term, these exports could grow more strongly if commodity prices increased further and investment and productive capacity expand.

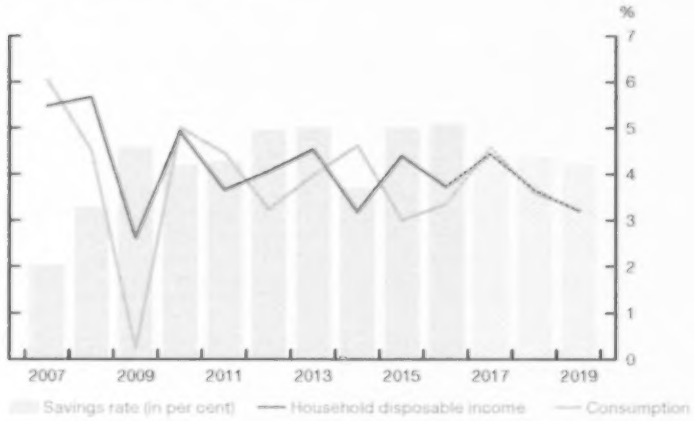
Household spending is expected to slow

Consumption growth is projected to moderate and residential investment is expected to contract modestly over 2018–19. Several factors are expected to weigh on household spending, notably, an anticipated slowdown in the growth of disposable income (**Chart 16**). Moreover, while financial conditions remain broadly stimulative, higher interest rates have increased the cost of new borrowing and of servicing outstanding debt. The higher borrowing costs are likely to dampen household spending, particularly on durable goods and housing. Given higher overall debt levels, such spending is expected to be more sensitive to interest rate changes than in previous cycles (see the **Appendix** for a description of recent changes to the modelling of household consumption and debt). While higher interest rates on consumer credit, home equity lines of credit and variable-rate mortgages affect borrowers immediately, the impact of the recent rate increases on holders of fixed-rate mortgages will be gradual. Mortgages with fixed rates of three to five years represent a large share of the total debt of households, and income gains should help fixed-rate mortgage holders to continue servicing their debt at renewal.[13]

13. In particular, at current interest rates, households with five-year fixed-rate mortgages can renegotiate at a lower rate than at origination, and most of those renewing over the projection horizon are likely to experience a lower debt-service ratio, mostly because of cumulative income gains. These mortgage-holders are thus well positioned to adapt to higher mortgage rates.

Chart 16: **Consumption growth is projected to moderate, in line with disposable income**

Nominal percentage change, annual data



Sources: Statistics Canada and Bank of Canada calculations and projections

Other factors are also expected to weigh on housing activity. The level of housing starts is projected to decrease in the coming years, in line with an anticipated gradual slowing of population growth. Moreover, macroprudential and other housing policy measures, while contributing to more sustainable debt profiles going forward, are also expected to weigh on housing demand. In particular, the Office of the Superintendent of Financial Institutions (OSFI) recently announced new guidelines aimed at reinforcing residential mortgage underwriting practices. These guidelines are expected to subtract about 0.2 per cent from the level of GDP by the end of 2019.[14] Taken together, recent interest rate increases and macroprudential policy changes are likely to have a moderating influence on residential investment as some prospective homebuyers respond by taking on smaller mortgages while others delay purchases.

CPI inflation is expected to increase to around 2 per cent

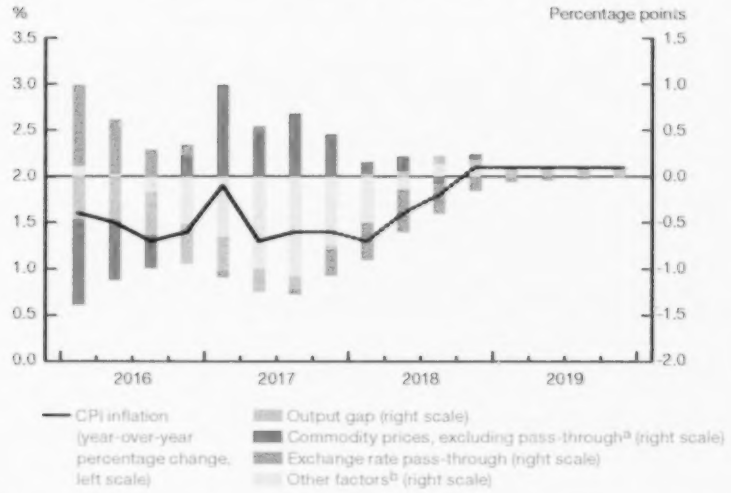
CPI inflation is anticipated to average 1.4 per cent in the fourth quarter and to move up to around 2 per cent in the second half of 2018, staying close to the target thereafter (Table 3 and Chart 17).

In the base-case projection, the gradual increase in projected inflation primarily reflects the unwinding of temporary factors. Downward pressures from below-average growth in food prices should completely dissipate by the beginning of 2018, while those from the electricity rebates in Ontario should last until the middle of the year. After subtracting an estimated 0.2 percentage points from inflation in the second half of 2017, pass-through effects of the stronger Canadian dollar are expected to become stronger, with a peak impact on inflation of -0.5 percentage points in the second quarter of 2018, before fading by the end of 2018.

14 OSFI published its review of Guideline B20, *Residential Mortgage Underwriting Practices and Procedures*, on October 17. The new guidelines take effect January 1, 2018. The Bank's estimate of the effects of these guidelines incorporates model simulations and historical experience following changes to housing regulations. There is considerable uncertainty around the overall impact of these measures on the economy because it is difficult to forecast the change in behaviour of borrowers and lenders.

Chart 17: **CPI inflation is expected to increase and remain close to 2 per cent over the projection horizon**

Contribution to the deviation of inflation from 2 per cent, quarterly data



a. This also includes the effect on inflation of the divergence from the typical relationship between gasoline and crude oil prices, the introduction of the cap-and-trade plan in Ontario and the Alberta carbon levy.

b. From mid-2016 until early 2018, on net, other factors mostly represent the expected impact of below-average inflation in food products and the estimated impact on electricity prices of Ontario's Fair Hydro Plan.

Sources: Statistics Canada and Bank of Canada estimates, calculations and projections

This projection is consistent with medium- and long-term inflation expectations remaining well anchored. The September 2017 Consensus Economics forecast for CPI inflation is 1.6 per cent in 2017 and 1.9 per cent in 2018. A quarterly question on long-term inflation expectations shows an average of 2 per cent through 2027.

Based on the past dispersion of private sector forecasts, a reasonable range around the base-case projection for CPI inflation is ±0.3 percentage points. This range is intended to convey a sense of forecast uncertainty. A complementary perspective is provided using statistical analysis of the Bank's forecast errors, which suggests that a 50 per cent confidence interval around the base-case projection widens from ±0.3 percentage points in the fourth quarter of 2017 to ±0.6 percentage points by the end of 2019. Over the same period, a 90 per cent confidence band widens from ±0.6 to ±1.5 percentage points.

Summary of key projection issues

The Canadian economy is operating close to capacity, and inflation is expected to increase to close to 2 per cent over the next several quarters. In this context, the Bank is focusing on assessing the importance of four key issues.

- The Bank is assessing the extent to which potential growth increases with strong demand, given that the economy is close to capacity. The base-case projection incorporates some effect of strong demand growth on potential.

- Global and technological factors have lowered inflation in advanced economies in recent years. Their impact on Canadian inflation to date does not appear to be significant, but work in this area continues. In the Bank's projection, the dynamics of inflation in Canada reflect the temporary effects of sector-specific factors, exchange rate pass-through and the evolution of economic slack.
- Despite recent labour market improvements, wage gains remain subdued and are likely to increase only gradually. The projection builds in scope for greater labour market participation and hours worked before wage increases would add meaningful upward pressure on inflation.
- Finally, household spending is being influenced by high levels of household debt and various macroprudential and other measures targeting the housing market. The Bank's main policy model has been revised to reflect that households are more responsive to interest rates when they are carrying elevated debt loads. The projection also incorporates estimates of the effects of the new housing measures.

The Bank will continue to monitor all of these issues, given their significance for the inflation outlook.

Appendix: Recent changes to ToTEM

The Terms-of-Trade Economic Model (ToTEM) is the Bank of Canada's main policy model. Since its creation in 2005, ToTEM has undergone two large-scale updates to incorporate advances in economic modelling, effectively expanding the range of policy questions that can be answered with the model. The first update (ToTEM II) was completed in 2011 and included the introduction of multiple interest rates and a more general structure of price- and wage-setting behaviour.[15] The second update (ToTEM III) is taking place this year. The new elements of the model consistently link higher levels of household indebtedness with a stronger response of output and consumption to interest rate changes, mainly because of variations in borrowers' consumption. This appendix briefly describes the most important changes included in ToTEM III.

Improved modelling of household debt

While the Bank has already incorporated household debt into two of its models that focus on financial stability issues (MP2, the Macroprudential and Monetary Policy Model, and HRAM, the Household Risk Assessment Model), ToTEM III represents the first effort to incorporate household debt into the Bank's main policy model.[16] More specifically, ToTEM III integrates the following key elements related to household debt.[17]

Households that borrow: In previous versions of ToTEM, a prominent role was given to a group of households that have accumulated wealth and use their savings to smooth their consumption (savers). ToTEM III now includes borrower households whose importance is roughly similar to that of savers. Borrowers differ from savers in their degree of impatience, with the former placing a relatively greater weight on present consumption than on future consumption. In equilibrium, this leads to a situation where borrowers finance some of their spending by receiving loans from savers.

Stock-flow dynamics: Household debt is assumed to evolve with principal payments and new loans. Principal payments are based on a constant amortization rate of loans over a horizon that is in line with the data.

Loan-to-value (LTV) ratio and home equity extraction: A collateral constraint in ToTEM III establishes that new loans to borrowers are equal to the sum of two components: (i) the value of their new housing investments multiplied by the current LTV ratio, plus (ii) a given share of their current home equity. The first component is meant to capture mortgages, while the second aims to capture home equity lines of credit. The model thus incorporates most forms of collateralized household debt observed in the data, which together account for more than 80 per cent of total household debt in Canada.

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15 See J. Dorich, M. K. Johnston, R. R. Mendes, S. Murchison and Y. Zhang, "ToTEM II: An Updated Version of the Bank of Canada's Quarterly Projection Model," Bank of Canada Technical Report No. 100 (October 2013).

16 Information about MP2 and HRAM can be found in S. Alpanda, G. Cateau and C. Meh, "A Policy Model to Analyze Macroprudential Regulations and Monetary Policy," Bank of Canada Staff Working Paper No. 2014-6 (February 2014); and B. Peterson and T. Roberts, "Household Risk Assessment Model," Bank of Canada Technical Report No. 106 (September 2016).

17 ToTEM II did not incorporate borrower activity. As a result, there was no treatment of stock-flow dynamics, loan-to-value ratio or home equity extraction, or of a mix of fixed and variable rates on outstanding debt.

Mix of fixed and variable rates: The effective interest rate for borrowers is a weighted average of the effective rate for the previous period and the rate paid on new loans. This feature allows the model to capture the mix of fixed- and variable-rate collateralized debt observed in the data.

A more detailed modelling of the housing market

ToTEM III also features a more elaborate structure of the housing market. On the demand side, the main innovation is that borrowers now contribute to overall housing demand, allowing mortgage debt to influence house prices. Moreover, since house prices affect the collateral constraint through their impact on housing investment and home equity, the model also incorporates a channel through which house prices affect household debt.

At the same time, the supply side of the model now includes a sector specifically for producing residential investment goods. This modification allows the model to track the residential investment price deflator, which was not the case in ToTEM II.[18] Further, housing in ToTEM III is constructed by combining residential structures and land. This assumption helps to establish a relationship linking house prices with the price of residential investment and the price of land.[19]

Enhanced estimation method

Most parameters in ToTEM III have been estimated using Bayesian methodology, which allows Bank staff to incorporate information from microdata and other sources. In contrast, the majority of parameters in ToTEM II were estimated using classical maximum likelihood methods.

Improved measures of the determinants of non-commodity exports

Canadian non-commodity exports are influenced by the real exchange rate and the level of foreign activity. Over the last two years, Bank staff have developed improved measures of these variables—the CEER (Canadian effective exchange rate) and GRACE (global real activity for Canadian exports).[20] With these new measures now included in ToTEM III, the model better explains the recent dynamics of non-commodity exports.

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18 In ToTEM II, residential investment goods were produced and supplied by the consumption sector, so there was no difference in the consumption price deflator and the residential investment price deflator.

19 In contrast, in ToTEM II, house prices were set by using a reduced-form equation that aimed to capture the supply side.

20 See R. Barnett, K. Charbonneau and G. Poulin-Bellisle, "A New Measure of the Canadian Effective Exchange Rate," Bank of Canada Staff Discussion Paper No. 2016-1 (January 2016); and A. Binette, T. Chernis and D. de Munnik, "Global Real Activity for Canadian Exports: GRACE," Bank of Canada Staff Discussion Paper No. 2017-2 (January 2017).

Risks to the Inflation Outlook

The prospect of a notable shift toward protectionist global trade policies is the most important source of uncertainty affecting the outlook. Recent developments, such as the use of targeted discretionary measures by the United States, are increasing uncertainty about the status of current and future trade agreements. However, the Bank has chosen not to fully quantify the implications of more-protectionist policies. More clarity is needed in order to narrow the range of possibilities, particularly regarding the specific details and timing of any policy changes. Nevertheless, as in July, the Bank attempts to better balance the risks around the outlook by incorporating at least some of the adverse impact of the elevated global uncertainty into the base case.

Aside from the uncertainty around global trade policies, the Bank's outlook for inflation is subject to several upside and downside risks originating from both the external environment and the domestic economy. Overall, the Bank assesses that the risks to the projected path for Canadian inflation are roughly balanced. As in past reports, the focus is on a selection of risks identified as the most important, drawing from a larger set of risks considered in the forecast.

The evolution of risks since July is summarized in Table 4. The risk of weaker exports and sluggish business investment in Canada has been modified to focus on the possibility of increased protectionist pressures and competitiveness challenges. As in July, the risk of higher potential output is discussed in conjunction with the risk of persistent weakness in inflation, highlighting the uncertainty surrounding the effects of structural factors and prolonged excess supply on inflation.[21]

(i) A shift toward protectionist trade policies and weaker Canadian exports

While the future of US trade policy is still unknown, a protectionist shift in the United States is already evident in several discretionary decisions. For example, the US administration has imposed countervailing duties on Canadian aircraft, and uncertainty around the outcome of the North American Free Trade Agreement (NAFTA) renegotiations is elevated. Other negative effects are also possible if additional US measures are implemented.[22] Although the Bank's projection for exports is cautious, there is a risk that exports will fall short of expectations, given the growing protectionist pressures and

21 The risks of higher global long-term interest rates and higher commodity prices mentioned in past reports are not highlighted here but are still being monitored.

22 The range of possibilities is wide, and the channels through which the measures would affect the economy are complex. See Box 1 of the April 2017 *Monetary Policy Report*.

continuing competitiveness challenges.[23] In this context, firms may respond to the growth of foreign demand by expanding their offshore production capacity rather than exporting from Canada. This movement offshore could lead to an additional drag on Canadian exports and business investment, since firms would hold back on expanding domestic capacity.

(ii) A larger impact of structural factors and prolonged excess supply on inflation

While many of the tame inflationary pressures in Canada and most advanced economies in recent years can be accounted for by economic slack and temporary factors, global structural factors may be playing a larger role than currently believed (Box 1). As well, the trajectory of potential output could be higher than anticipated. As the economy approaches full capacity, business investment could rise by more than expected, and stronger economic activity could lead to the return of workers who had left the labour force or were underemployed. While significant uncertainty surrounds these effects, the level of potential output could be as much as 1 per cent higher than expected by the end of 2020.[24] The stronger these effects are, the more likely firmer economic growth could be generated without creating additional inflationary pressures relative to the base case.

Uncertainty also surrounds the persistence of the effect of past excess supply on inflation and whether the relationship between the output gap and inflation has weakened.

(iii) Stronger real GDP growth in the United States

Efforts toward deregulation and prospects for sizable federal corporate and personal tax cuts in the United States could boost US economic growth. Deregulation, if it enhances competitiveness in an environment of accommodative financial conditions, elevated equity prices and corporate profits, could help trigger "animal spirits." A further improvement in business confidence could lead to an acceleration in the pace of investment, firm creation, innovation and productivity growth. In addition, potential tax cuts could provide a modest boost to consumption and investment growth, although the precise effects will depend on the timing, magnitude and distribution of any cuts. Stronger US household spending and public and private investment would have positive spillovers for Canadian business confidence, investment and exports.

(iv) Stronger consumption and rising household debt in Canada

Strong spending, combined with elevated consumer confidence, points to underlying strength. While recent data on motor vehicle and retail sales indicate a slowdown in the coming quarters, the recent strength of consumption could persist if growth in wages and household incomes were to increase faster than expected as the labour market approaches full employment. Moreover, the recent robust credit growth could last longer than anticipated. This would provide a

23 For example, the impact of trade restrictions on softwood lumber exports is incorporated into the base case.

24 For more details, see J. Yang, B. Tomlin and O. Gervais, "Alternative Scenario to the October 2017 MPR Base-Case Projection: Higher Potential Growth," Bank of Canada Staff Analytical Note No. 2017-18 (October 2017).

boost to economic activity, but it could further exacerbate the macroeconomic and financial vulnerabilities associated with high household indebtedness.

(v) A pronounced drop in house prices in overheated markets

Imbalances in the Canadian housing market remain an important vulnerability, particularly in the greater Toronto and Vancouver areas.[25] In the context of elevated levels of consumer indebtedness, households could be even more sensitive to interest rate increases than assumed in the base case, which could trigger an adjustment in house prices in regions with elevated valuations. A large regional decline in house prices would have important adverse effects on residential investment and on related consumption and real estate services in the affected regions. Such a fall in house prices could further weigh on consumption through negative wealth and collateral effects. Overall, a pronounced decline in house prices in some regions could have a material negative impact on the economic outlook in those regions, with modest direct spillovers to the rest of the country.

Table 4: **Evolution of risks since the July *Monetary Policy Report***

Risk	What has happened	What is being monitored
A shift toward protectionist trade policies and weaker Canadian exports	▪ Global uncertainty remains elevated ▪ Real goods exports fell by 5.9 per cent from May to August ▪ The US government imposed countervailing and anti-dumping duties on exports of Canadian aircraft ▪ NAFTA renegotiations commenced in August	▪ Foreign demand measures ▪ Export market shares ▪ US business investment and other sources of demand for Canadian exports ▪ Trade policy developments
A larger impact of structural factors and prolonged excess supply on inflation	▪ CPI and core inflation measures have increased in recent months but remain below 2 per cent ▪ Wage growth remains modest ▪ Growth in average hours worked is weak ▪ Labour productivity growth has been strong in recent quarters	▪ Measures of core inflation ▪ Estimates of the output gap ▪ Inflation expectations ▪ Measures of slack in the labour market, such as wages, involuntary part-time work, hours worked, youth participation, prime-age workers' participation and long-term unemployment ▪ Adoption of new technologies, growth in e-commerce ▪ Firm creation, business investment and productivity ▪ Indicators of investment intentions and the business sentiment of Canadian firms
Stronger real GDP growth in the United States	▪ Business and consumer confidence remain high ▪ Firm creation has increased, but labour productivity growth remains modest despite recent improvement ▪ Policy uncertainty remains elevated	▪ Business and consumer confidence ▪ Firm creation, investment and industrial production ▪ Labour force participation rate and labour productivity ▪ Formal budget and other policy announcements
Stronger consumption and rising household debt in Canada	▪ Consumption kept its strong pace in 2017Q2 with motor vehicle sales and retail sales stronger than expected ▪ Employment and income also grew, pushing the savings rate up in 2017Q2 ▪ Household indebtedness has continued to rise	▪ Motor vehicle and retail sales ▪ Consumer sentiment ▪ Housing activity and prices ▪ Household indebtedness and savings behaviour
A pronounced drop in house prices in overheated markets	▪ Housing activity and residential investment pulled back in 2017Q2, weighed down by declines in Ontario ▪ House price growth has slowed somewhat in recent months	▪ Housing activity and prices ▪ Consumer sentiment ▪ Household spending ▪ Regulatory environment ▪ Residential mortgage credit

25 For more details, see Risk 2 in the June 2017 *Financial System Review*.